

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

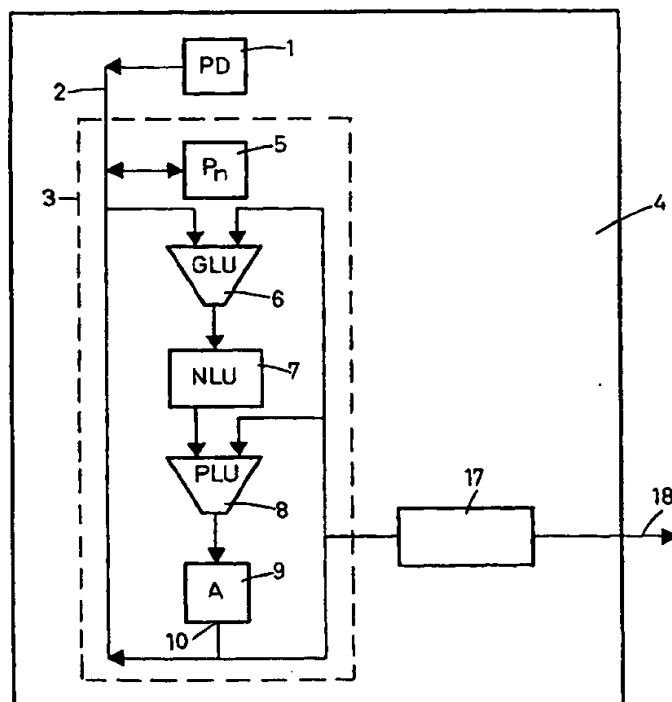
PCTWORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶: H04N	A2	(11) International Publication Number: WO 95/24793 (43) International Publication Date: 14 September 1995 (14.09.95)
(21) International Application Number: PCT/SE95/00159 (22) International Filing Date: 16 February 1995 (16.02.95) (30) Priority Data: 9400761-4 3 March 1994 (03.03.94) SE (71) Applicant (for all designated States except US): IVP INTEGRATED VISION PRODUCTS AB [SE/SE]; Teknikringen 2C, S-583 30 Linköping (SE). (72) Inventors; and (75) Inventors/Applicants (for US only): FORCHHEIMER, Robert [SE/SE]; Tingsvägen 24A, S-582 49 Linköping (SE). WASELL, Björn [SE/SE]; Löjtnantsgatan 22, S-590 60 Ljungsbro (SE). (74) Agents: WILLQUIST, Bo et al.; Albihn Willquist AB, S:t Larsgatan 23, S-582 24 Linköping (SE).		(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG). Published <i>Without international search report and to be republished upon receipt of that report.</i>

(54) Title: ARRANGEMENT AND METHOD FOR READING IN AND COMPRESSION OF DATA FOR TELEFAX TRANSMISSION**(57) Abstract**

The present invention relates to an arrangement and a method for reading in and compression of data for telefax transmission or document reading. The arrangement comprises photo-diodes (1) arranged on a substrate in matrix form, which photo-diodes, in conjunction with picture-processing and signal-processing circuits linked to the photo-diodes and control logic, are executed in integrated form on one and the same substrate. The aforementioned picture-processing and signal-processing circuits comprise a first logic circuit (6), which is so arranged as to detect picture elements in a signal read in by the photo-diodes, which picture elements satisfy a predetermined digital condition. A second logic circuit (7) is so arranged as to detect the edges of the aforementioned picture elements, and a third logic circuit (8) is so arranged as to eliminate elements detected by preceding circuits from the stored signal. The signal is finally converted in a digital network (17) of a combinative or sequential kind into a compressed form suitable for telefax transmission or document reading.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Larvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

Arrangement and method for reading in and compression of data
for telefax transmission

The present invention relates to an arrangement for reading in and compression of data for telefax transmission or document reading comprising photo-diodes arranged on a substrate in matrix form, which photo-diodes, in conjunction with picture-processing and signal-processing circuits
5 connected to the photo-diodes, are executed in integrated form on one and the same substrate.

The invention also relates to a method for reading in and compression of data for telefax transmission or document
10 reading, for which photo-diodes arranged on a substrate in matrix form are used, which photo-diodes, in conjunction with picture-processing and signal-processing circuits connected to the photo-diodes, are executed in integrated form on one and the same substrate.

15 The unidimensional picture representation used in telefax transmission makes it advantageous, when reading a document in a fax, to make use of optical sensors arranged in linear form. These convert the picture signal into an electrical
20 signal, which is then usually transmitted in serial form to a microprocessor, in which the signal is compressed in such a way that its information content can be transmitted in a less space-consuming and more rapid fashion, for example by means of burst length coding. Although reading can be
25 executed rapidly with today's fax transmission methods, it is difficult rapidly to convert the information in a document into a form suitable for transmission because the signal is transmitted uncompressed in serial form from the optical sensor to the microprocessor. Serial transmission to the
30 microprocessor and compression are highly time-consuming operations.

Previously disclosed in EP, A, 0323 183 is an integrated circuit which comprises a number of photo-sensors with

picture-processing and signal-processing circuits arranged on the same substrate. The signal-processing circuits are not, however, arranged to perform compression of the information intended for transmission.

5

Previously disclosed in SE, A, 8301398-7 is an arrangement for an array of photo-diodes arranged in the form of a matrix, which are connected to an picture-processing processor of the kind that permits parallel signal processing. The arrangement is characterized in that it comprises a circuit of a combinative or sequential kind, which is also arranged on the aforementioned substrate, and which is used in order to make a numerical and/or positional determination of picture elements which, via the diode matrix and the picture-processing processor, are found to satisfy one or other predetermined digital condition. This circuit is primarily so arranged as to be used for industrial applications such as quality control and particle counting.

20 The object of the present invention is to present an arrangement for reading in and compression of data for telefax transmission or document reading, which is based on the above-mentioned combination of photo-diodes, a signal-processing processor and a circuit of a sequential or
25 combinative kind arranged on a substrate, and which solves the above-mentioned problems associated with telefax transmission. This is achieved in that the aforementioned picture-processing and signal-processing circuits comprise a first logic circuit, which is so arranged as to detect
30 picture elements in a signal read in by the photo-diodes, which picture elements satisfy a predetermined digital condition, a second logic circuit, which is so arranged as to detect the edges of the aforementioned picture elements, a third logic circuit, which is so arranged as to eliminate
35 elements detected by preceding circuits from the stored signal, and a digital network of a combinative or sequential kind, which is so arranged, with reference to the detected picture elements, as to convert the signal into a compressed

form suitable for telefax transmission or document reading.

According to one particular characteristic of the invention, the aforementioned third logic circuit is so arranged as to
5 test the connectivity between objects in consecutive lines in the picture.

According to a further particular characteristic of the invention, the aforementioned digital network is so arranged
10 as to convert the signal read in into burst length coding.

A method in accordance with the invention is characterized in that picture elements in a signal read in by the photo-
diodes, which picture elements satisfy a predetermined
15 condition, are detected in a first logic circuit, in that the edges of the aforementioned picture elements are detected in a second logic circuit, in that picture elements detected by the preceding circuits are eliminated from the stored signal in a third logic circuit, and in that the signal read in is
20 converted in a digital network of a combinative or sequential kind connected to the circuit, with reference to the detected picture elements, into a compressed form suitable for telefax transmission or document reading.

25 According to a particular characteristic of a method in accordance with the invention, the connectivity between objects on consecutive lines in the picture is tested in the aforementioned third logic circuit, after which the connectivity information is converted in the digital network
30 into a form suitable for telefax transmission.

The invention is described below in greater detail with reference to the accompanying drawing, in which Fig. 1 is a simplified block diagram for an arrangement in accordance
35 with the invention constructed on a single substrate. Advantageous embodiments of units contained in the arrangement are shown in Fig. 2 and Fig. 3, and Fig. 4a - Fig. 4d show signals stored in the register at different

times.

Fig. 1 shows a diode matrix 1 comprising a number of photo-diodes (PD = photo-diode) which is connected via a data bus 2 to an picture-processing processor 3. The signals detected by the photo-diodes are converted into digital form before they are processed in the picture-processing processor, which is linked to a digital signal-processing circuit 17. The photo-diode matrix, the picture-processing processor 3 and the signal-processing circuit 17 are arranged on a common substrate. Both the picture-processing processor 3 and the signal-processing circuit 17 are capable of performing parallel operations that are executed at clock cycle intervals.

The picture-processing processor comprises an array of picture registers 3 (P_n = picture register) linked to first logic circuits 6 (GLU = global logical unit), which facilitates the calculation of certain global picture characteristics, and an accumulator register 9 (A = accumulator register). The array of picture registers 5 and the accumulator register 9 are used for the intermediate storage of pictures. The GLU unit 6 is so arranged in a previously disclosed fashion as to identify from a picture A supplied from the accumulator register 9 objects that are indicated by a picture coming from the data bus, and as to detect the edges of the aforementioned object in the picture, which originates either from the diode matrix 1 or the array of picture registers 5. An advantageous embodiment of the GLU unit is shown in Fig. 3.

The picture processing circuits also contain other logic circuits 7 (NLU = neighbourhood logical unit) and third logic circuits 8 (PLU = point logical unit). The NLU circuits 7 are so arranged as to identify the edges of the objects and to invert a picture coming from the GLU unit 6. Each local area in the picture is compared with a template, and when the picture coincides with the template, this is marked with a

logical zero or one. The PLU circuits 8 are so arranged as to execute point logical operations of the type AND, OR and EXCLUSIVE OR between two pictures from the accumulator register and from the NLU circuits. For example, EXCLUSIVE OR operations are used for identifying differences between the
5 aforementioned pictures. The information obtained in this way is transmitted to a digital network 17, in which the information is encoded in a form suitable for transmission.

10 The digital network 17, which has parallel input and serial output, is connected to the processor 3. This network is so arranged as to determine the number of picture points which satisfy a digital condition. One possible embodiment of this network is shown in Fig. 2. In the case of the customary
15 burst length coding for the telefax transmission, this means that the output signal will contain numerical values which correspond to the number of consecutive ones or the number of consecutive zeros. A digital number which represents the information read in is thus obtained at the output 18 from
20 the network. This result is read out in serial form to further signal-processing circuits, such as Huffman encoders, or directly to an appropriate communication circuit. Because all information processing is done in parallel, a compressed output signal can be obtained on the output 18 from the
25 network very shortly after reading in the picture signal.

The reading-in and signal processing of a unidimensional, binary picture signal, a line in a black-and-white telefax document, is explained in simplified terms below with
30 reference to Figs. 4a-4d.

Figure 4a shows a first line signal read in by the photo-diode matrix, which signal is digitalized and stored in a picture register 5. In a first operation in the circuit, the
35 GLU unit 6 and the NLU unit 7 are used in combination to detect the edge of the first object in the picture, that is the first area with one or more consecutive ones (black field). The result, which can be appreciated from Fig. 4b, is

stored in the accumulator register 9 while the digital network 17 determines the number of consecutive zeros as far as that edge identification.

5 The signal stored in the A-register 9 is then able, together with the signal stored in the picture register 5, to act as the input signal for the GLU circuit 6. This circuit has the capacity during a single clock cycle interval to detect the whole of the first object, see Fig. 4c, irrespective of its
10 length. The length of the detected object is then determined in the digital network 17, the output signal from which is now a number which represents the length of the object.

The new result picture, see Fig. 4c, is also transmitted to
15 the PLU circuits, which are able to perform logical EXCLUSIVE OR operations between two pictures. The result picture is compared here with the originally stored picture, which results in a new picture being obtained, in which the first object can no longer be seen, see Fig. 4d. This new picture
20 is stored in a picture register 5, after which the operations in accordance with the above are repeated on the new picture.

Obtained at the output 18 from the network 17 are numbers which correspond to the number of consecutive zeros and ones
25 in a picture, i.e. in all essential respects the code which is used at present for the telefax transmission. The picture information is thus compressed to a significant degree in the circuit indicated above.

30 Once compression of the first line is complete, a new line picture can be read in, after which the operations in accordance with the above are repeated on it.

The circuits described above are also well suited to other
35 types of compression coding. The circuits can be used, for example, to make comparisons at any time between consecutive pictures, so that additional signal information is transmitted only for those areas in which the signals differ.

It is possible in this way to take advantage of the fact that two consecutive lines in a telefax transmission often exhibit considerable similarities.

- 5 The invention can naturally also be used when the input signals are not binary but, for example, contain both grey scale and colour, as will be appreciated by a person skilled in the art.
- 10 It is obvious that the invention must not be regarded as being restricted to the embodiment shown in the drawing or the example described above, and that it may be varied in many ways within the scope of the idea of invention; for instance, it may be used with a type of coding other than
- 15 burst length coding.

It is also obvious that the invention can be used in other document reading contexts, for example in so-called scanners.

Patent Claims

1. Arrangement for reading in and compression of data for
5 telefax transmission or document reading comprising
photo-diodes (1) arranged on a substrate in matrix
form, which photo-diodes, in conjunction with picture-
processing and signal-processing circuits (3, 17)
connected to the photo-diodes and control logic, are
executed in integrated form on one and the same
10 substrate, *characterized* in that the aforementioned
picture-processing and signal-processing circuits (3,
17) comprise a first logic circuit (6), which is so
arranged as to detect picture elements in a signal read
in by the photo-diodes, which picture elements satisfy
15 a predetermined digital condition, a second logic
circuit (7), which is so arranged as to detect the
edges of the aforementioned picture elements, a third
logic circuit (8), which is so arranged as to eliminate
elements detected by preceding circuits from the stored
20 signal, and a digital network (17) of a combinative or
sequential kind, which is so arranged, with reference
to the detected picture elements, as to convert the
signal into a compressed form suitable for telefax
transmission or document reading.
25
2. Arrangement in accordance with Patent Claim 1,
characterized in that the aforementioned third logic
circuit (8) is so arranged as to test the connectivity
between objects in consecutive lines in the picture.
30
3. Arrangement in accordance with one or other of the
preceding Patent Claims, *characterized* in that the
aforementioned digital network (17) is so arranged as
to convert the signal read in into burst length coding.
35
4. Method for reading in and compression of data for
telefax transmission or document reading, whereby
photo-diodes (1) arranged in matrix form are used,

which photo-diodes, in conjunction with picture-processing and signal-processing circuits (3, 17) connected to the photo-diodes and control logic, are integrated on one and the same substrate, *characterized* in that picture elements in a signal read in by the photo-diodes, which satisfy a predetermined digital condition, are detected in a first logic circuit (6), in that the edges of the aforementioned picture elements are detected in a second logic circuit (7), in that picture elements detected by the preceding circuits (6, 7) are eliminated from the stored signal in a third logic circuit (8), and in that the signal read in is converted in a digital network (17) of a combinative or sequential kind connected to the circuit, with reference to the detected picture elements, into a compressed form suitable for telefax transmission or document reading.

5. Method in accordance with Patent Claim 4, *characterized* in that the connectivity between objects on consecutive lines in the picture is tested in the aforementioned third logic circuit, and that the connectivity information is converted in the digital network into a form suitable for telefax transmission.

25

FIG. 1

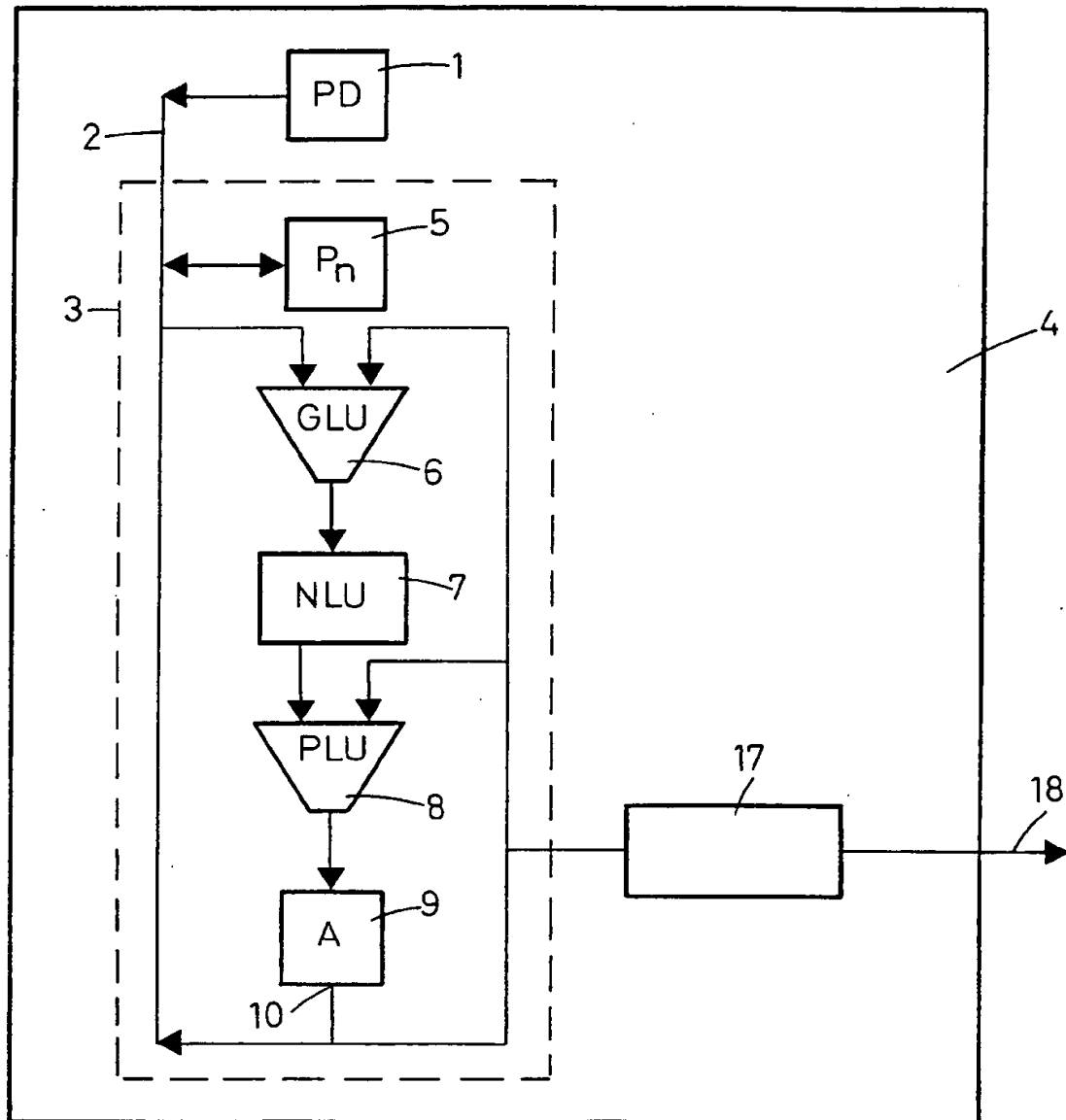


FIG. 2

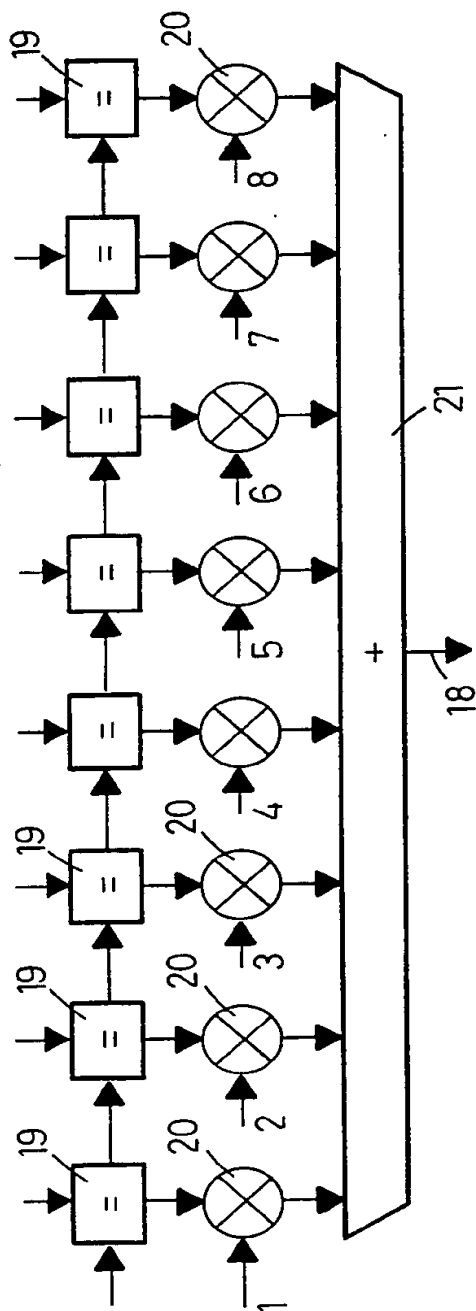


FIG. 3

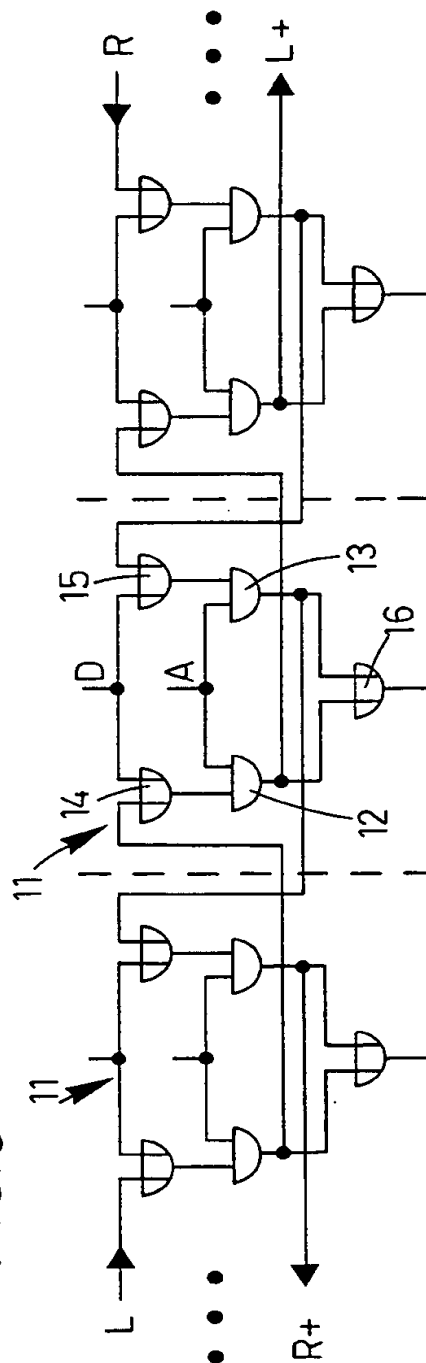


FIG. 4a



FIG. 4b



FIG. 4c

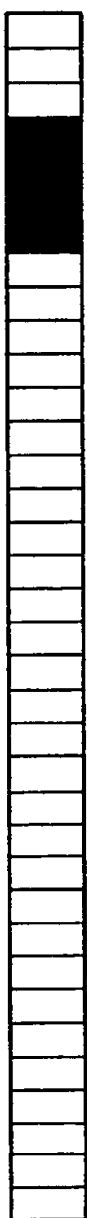
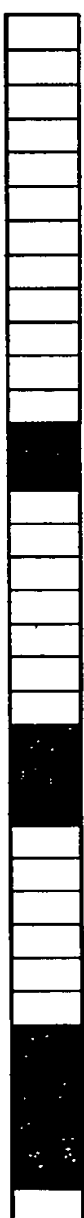


FIG. 4d



PCTWORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

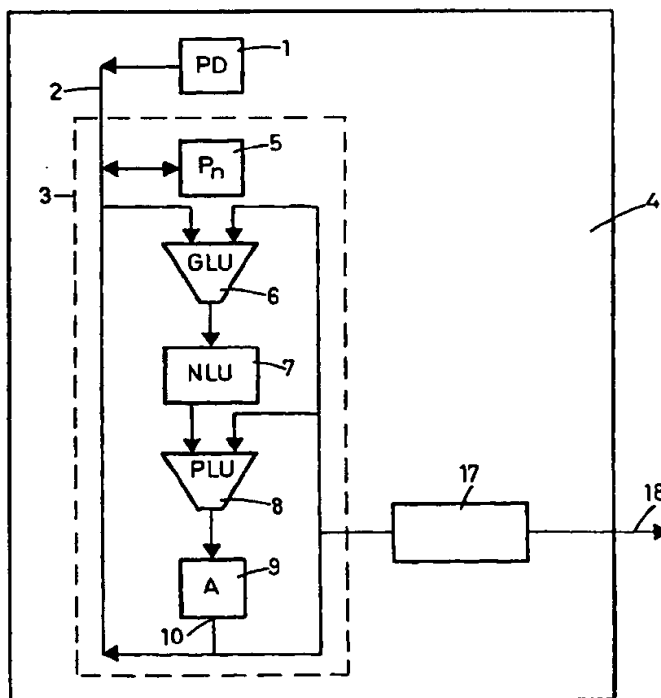
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : H04N 1/411		A3	(11) International Publication Number: WO 95/24793
			(43) International Publication Date: 14 September 1995 (14.09.95)
(21) International Application Number: PCT/SE95/00159		(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG).	
(22) International Filing Date: 16 February 1995 (16.02.95)			
(30) Priority Data: 9400761-4 3 March 1994 (03.03.94) SE			
(71) Applicant (for all designated States except US): IVP INTEGRATED VISION PRODUCTS AB [SE/SE]; Teknikringen 2C, S-583 30 Linköping (SE).			
(72) Inventors; and (75) Inventors/Applicants (for US only): FORCHHEIMER, Robert [SE/SE]; Tingsvägen 24A, S-582 49 Linköping (SE). WASELL, Björn [SE/SE]; Löjtnantsgatan 22, S-590 60 Ljungsböro (SE).			
(74) Agents: WILLQUIST, Bo et al.; Albihn Willquist AB, S:t Larsgatan 23, S-582 24 Linköping (SE).		Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	
		(88) Date of publication of the international search report: 5 October 1995 (05.10.95)	

(54) Title: ARRANGEMENT AND METHOD FOR READING IN AND COMPRESSION OF DATA FOR TELEFAX TRANSMISSION

(57) Abstract

The present invention relates to an arrangement and a method for reading in and compression of data for telefax transmission or document reading. The arrangement comprises photo-diodes (1) arranged on a substrate in matrix form, which photo-diodes, in conjunction with picture-processing and signal-processing circuits linked to the photo-diodes and control logic, are executed in integrated form on one and the same substrate. The aforementioned picture-processing and signal-processing circuits comprise a first logic circuit (6), which is so arranged as to detect picture elements in a signal read in by the photo-diodes, which picture elements satisfy a predetermined digital condition. A second logic circuit (7) is so arranged as to detect the edges of the aforementioned picture elements, and a third logic circuit (8) is so arranged as to eliminate elements detected by preceding circuits from the stored signal. The signal is finally converted in a digital network (17) of a combinative or sequential kind into a compressed form suitable for telefax transmission or document reading.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 95/00159

A. CLASSIFICATION OF SUBJECT MATTER		
IPC6: H04N 1/411 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
IPC6: H04N		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
SE,DK,FI,NO classes as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Patent Abstracts of Japan, Vol 13, No 353, P-913, abstract of JP, A, 1-112469 (FUJITSU LTD), 1 May 1989 (01.05.89)	1,4
A	--	2,5
Y	WO 8403810 A1 (WILLQUIST, BO), 27 Sept 1984 (27.09.84), abstract	1,4
A	US 4499499 A (NORMAN F. BRICKMAN ET AL), 12 February 1985 (12.02.85), column 2, line 10 - line 29, abstract	3
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
6 Sept 1995		06-09-1995
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86		Authorized officer Bengt Jonsson Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 95/00159

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5014334 A (TAKAHIRO FUKUHARA ET AL), 7 May 1991 (07.05.91), column 1, line 53 - line 66; column 3, line 41 - line 52 -----	1,4

INTERNATIONAL SEARCH REPORT
Information on patent family members

31/07/95

International application No.
PCT/SE 95/00159

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO-A1- 8403810	27/09/84	AU-B- 565350 AU-A- 2656684 CA-A- 1210852 DE-A- 3472051 EP-A,B- 0168399 JP-B- 6095012 JP-T- 60500887 SE-B,C- 431145 US-A- 4684991	10/09/87 09/10/84 02/09/86 14/07/88 22/01/86 24/11/94 06/06/85 16/01/84 04/08/87
US-A- 4499499	12/02/85	EP-A,A,A 0112991 JP-C- 1352923 JP-A- 59125164 JP-B- 61018381	11/07/84 11/12/86 19/07/84 12/05/86
US-A- 5014334	07/05/91	JP-A- 2296477	07/12/90